

Space for Youth Competition

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Abstract:

Education is one of the principal Sustainable Development Goals (SDG) because it can have a spill over effect on the other goals. An educated society stands a better chance at reaching the SDGs.

Space education, a top priority for most nations, focuses on technical education for employment in space and related sectors. However, space (topics) can also be leveraged to improve general educational outcomes. Space, being universally fascinating, can be a key catalyst in education. Several projects have already used space topics and contexts to teach literacy, numeracy, programming etc. Here the end goal is not to impart an education in space but rather use the excitement of space to better teach a standard curriculum. Space topics are also well suited to instil tolerance and empathy, especially relevant in our highly globalized world with multiple breaking points.

A proposed plan to leverage the potential of space topics is to create an open-source, online repository containing space contextualized examples to teach various subjects. Over time, with more users, evaluations and studies can be carried out in classrooms across the world in order to uncover the most effective ways of leveraging space topics to improve educational outcomes.

Introduction:

Space has provoked questions in humanity for thousands of years. Space/Astronomy is said to be one of the oldest sciences. The sky was the biggest laboratory of our ancestors. It intrigued and stimulated them, led to the creation of mythology, culture, and the beginnings of science and mathematics.

Centuries later, not everything has changed. Space continues to inspire us, brings us together, and enriches our culture and imagination. Most importantly, space is loved by both adults and children and is an effective tool to generate interest in education, especially STEM (Science, Technology, Engineering, Mathematics) topics.

Leveraging Space for Education:

In a fractured world with thousands of opinions, space is the closest that we can get to universal consensus. The Relevance of Science Education survey, a study of the attitudes of children toward science and technology in more than 30 countries across Africa, Asia, and Europe,

found that space topics are the most popular among both genders (Sjøberg and Schreiner, 2010).

Space adds tremendous value to any context. From entertainment to business to sports, individuals and organizations have piggy-backed on the allure of space. Worldwide, space takes centre stage in numerous informal education activities at science centres, space agencies, museums etc. The use of space contexts in activities is known to stimulate student interest. For example, a robotics competition can be enlivened by structuring it as a Mars rover challenge.

While space education is vital to develop a high-skilled workforce, *we mustn't just teach about space but use space to teach*. Several projects have taken the lead in leveraging space for education.

1. Space topics have been used successfully to teach and improve reading, mathematics, and programming. By using examples in a space context, these subjects are made more appealing to students. In fact, preliminary analysis has revealed improved learning outcomes for students who were taught with this approach (Dobrowolski, 2016).
2. A globally critical issue is the rapid dissemination of unscientific and unsound ideas through the phenomenon of 'fake news'. Therefore, it is highly necessary to impart a scientific temper among children and adults alike. Again, space and astronomy topics are proving to be effective in teaching critical thinking.
3. Even very young children are captivated by space. Programs such as Universe Awareness have focused on early childhood stimulation using space and astronomy precisely due to the attractive qualities of these topics (UNAWAWE, 2019). Studies have shown that investing in such early childhood interventions leads to higher returns, increasing future earnings by 25 percent (Gertler *et al.*, 2014) and increasing the likelihood of being employed in high-skilled jobs (World Bank Group, 2017), thus leading to a better developed society.
4. Space and astronomy, by their very nature, provide a big picture perspective, advancing a view of common humanity. It makes them excellent catalysts in diplomacy, bringing people and groups together. For example, the Columba-Hypatia project uses astronomy and space as tools for encouraging meaningful communication and a culture of peace on the post-conflict island of Cyprus (Columba-Hypatia team, 2017). The project brought together children from both sides of the island for a day of space and astronomy educational activities. Children from either side of the island worked together to create a 'Cypriot Golden Record', similar to the Golden Record on the Voyager spacecraft (NASA JPL, 2019). This experience helped the children interact and learn about each other, thus 'humanising the other'.
5. Our work has also shown that space could be used to stimulate empathy and altruistic characteristics in children. In a randomized controlled study, middle school children were exposed to the concept of the 'Pale blue dot', the idea espoused by Carl Sagan and others that knowing one's place in the Universe induces more empathy towards fellow humans (Fukushima and Venugopal, 2018). This is similar to the 'Overview effect',

the feeling of universal brotherhood experienced by astronauts when they see Earth from space as a single entity without borders (Yaden *et al.*, 2016).

Space in the Curriculum:

This universal fascination with the sky and space, which sowed the seeds of our modern, scientific world, can be a major enabler in education.

While more work is required to test the best way of leveraging space topics, what is clear is that space has a role in education. Using space topics in the global curricula could potentially improve educational outcomes while also teaching tolerance and empathy. It will also eventually lead to a space literate population.

One way of globally implementing this scheme is to create an open repository of space contextualized examples to teach various subjects at different levels. Such an open-source repository will allow anyone to use the content as well as make contributions. The system can be designed to benefit from existing content in various languages.

Since space is universally relatable, any materials developed will be globally applicable. This empowers educators to target under-represented groups or under-served regions, spending less effort on adapting lessons to the local context.

Conclusion:

Space will undoubtedly play a defining role in the future of humanity. To prepare for this future, space education will be a top priority for most governments. While advocating for space education, we must also recognize and leverage the potential value of using space topics to improve our overall education. And thus, permit a better chance at attaining the sustainable development goals.

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